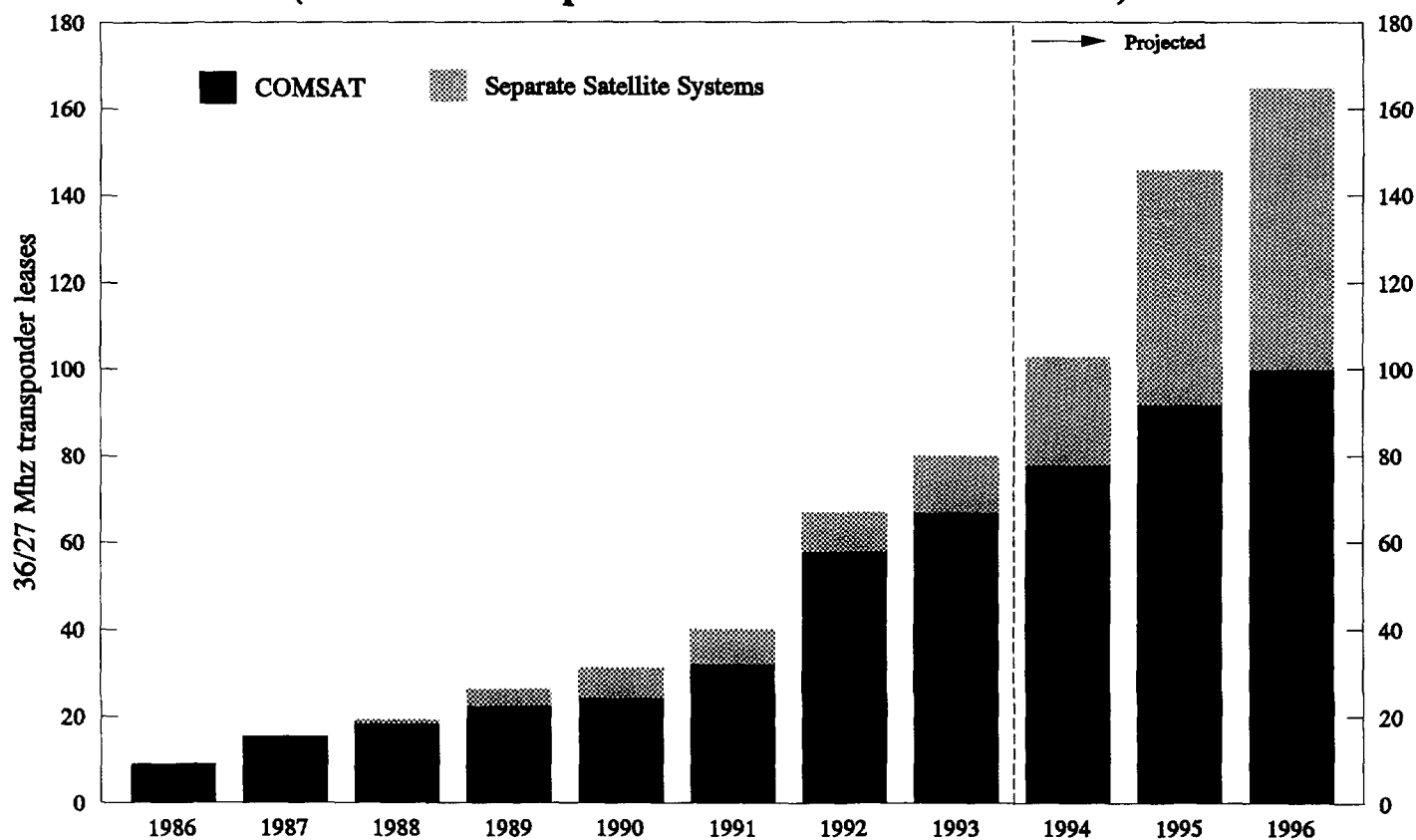


Figure 12
Utilized Capacity for Trans-Oceanic Video and Audio Services:
COMSAT vs. Separate Satellite Systems
(36/27 Mhz transponder leases to and from the U.S.)



NOTES:

Does not include services on cables or on separate satellite systems other than PanAmSat and Orion 1.

Also does not include capacity on U.S. domestic satellites available for service to the Caribbean and Latin America.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-6.1

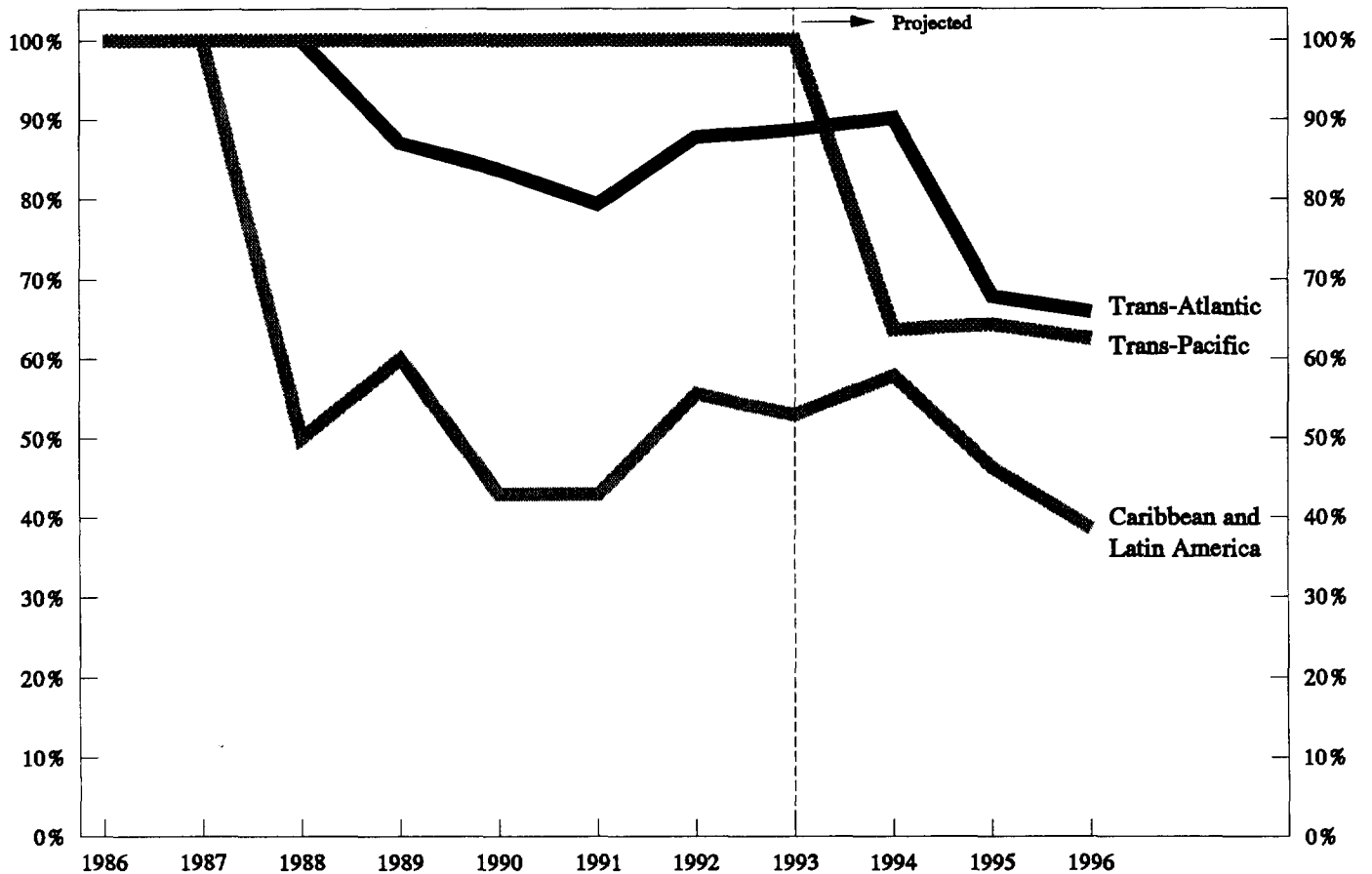
Figure 13 (on page 70) provides an excellent illustration of why high current market share data can be misleading: once pre-subscribed facilities become operational, there is an abrupt adjustment to the market shares because the inroads made by new entrants prior to launch had not previously been recorded. For video and audio services to the Caribbean and Latin America, COMSAT's market share dropped from 100 percent in 1987 to 50 percent in 1988 and continues to trend downwards. In trans-Atlantic service, COMSAT's market share started to decline in 1989 and is projected to be below 70 percent by 1995. Finally, in the trans-Pacific market for video and audio services, COMSAT's market share in terms of utilized capacity is projected to drop to approximately 60 percent in 1994.

The extent of competition becomes more obvious when COMSAT's share of incremental demand is calculated.¹¹⁷ Incremental market shares show COMSAT's share of the new demand that occurs in a growing market. A company with low incremental market share will fail to capture much of the new business and its average market share will continue to decline.

Figure 14 (on page 71) shows COMSAT's shares of incremental demand for video and audio revenues. From 1988 through the end of 1996, the market for video and audio services to the Caribbean and Latin America will grow by 25 transponder leases, of which COMSAT is only expected to capture nine — equivalent to an incremental market share of 36 percent. The trans-Pacific market segment is expected to grow from 1993 through 1996 by 29 transponder leases with an incremental COMSAT market share of only 38 percent. The trans-Atlantic market segment is expected to grow from 1989 through 1996 by 79 transponder leases, leaving COMSAT with a projected incremental market share of approximately 60 percent. This projection, however, includes neither any trans-Atlantic video services on the TDRSS-east, Hispasat, Globostar-1, Gorizont-20 and Gorizont-26 satellites, nor any video services that may be carried on fiber optic cables. It therefore likely overstates COMSAT's incremental market share in that region.

¹¹⁷ COMSAT's shares of "incremental" demand are COMSAT's shares of video and audio growth since the emergence of competition from separate satellite systems in the various market segments. For example, in the trans-Atlantic market segment, shares of incremental demand will be COMSAT's share of the growth that will have taken place between 1989 and 1996; in the trans-Pacific market segment, it is the share of growth between 1994 and 1996.

Figure 13
COMSAT Market Shares in
Utilized Capacity for Trans-Oceanic Video and Audio Services
(Based on 36/27 Mhz transponder leases to and from the U.S.)



NOTES:

Does not take into consideration services on cables or on separate satellite systems other than PanAmSat or Orion 1.
 Also does not take into consideration capacity on U.S. domestic satellites available for service to Caribbean and Latin America.

See Chapter V for a further discussion of data sources and assumptions.

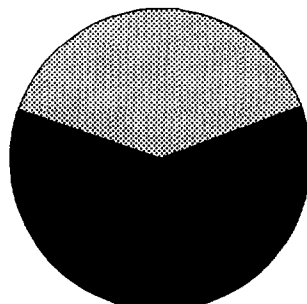
Source: Exhibit HSH-6.1

Figure 14

Market Growth and COMSAT Incremental Market Shares of Trans-Oceanic Video and Audio Services

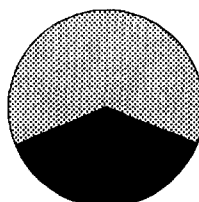
(Based on 36/27 Mhz transponder leases to and from the U.S.)

Trans-Atlantic (1989 -1996)
79 Total Incremental Leases



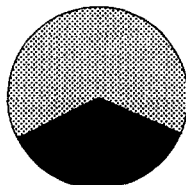
60.9%

Trans-Pacific (1994-1996)
29 Total Incremental Leases



37.9%

Caribbean and Latin America (1988-1996)
25 Total Incremental Leases



36.0%

■ COMSAT ■ Other Facilities

NOTES:

Does not take into consideration services on cables or on separate satellite systems other than PanAmSat and Orion 1. Also does not take into consideration capacity on U.S. domestic satellites available for service to Caribbean and Latin America.

The relative size of the pies reflects the size of the market segment.

See Chapter V of the study for a further discussion of data sources and assumptions.

Source: Exhibit HSH-6.1

COMSAT'S MARKET SHARE IN VIDEO AND AUDIO REVENUES

The extent of competition that COMSAT faces is even more visible when market shares are expressed in terms of revenues instead of utilized capacity.¹¹⁸ For example, PanAmSat is one of COMSAT's main competitors for video and audio services in South America and has been very successful in finding customer commitments for its new AOR and POR satellites that will be launched this year and in 1995.¹¹⁹

Revenues from video and audio services for COMSAT and separate satellite systems are shown in **Figure 15** (see page 73). Since separate satellite systems started operations in 1988, their share of total revenues has increased rapidly. COMSAT's share of total video and audio revenues is expected to drop to approximately 40 percent by 1995.

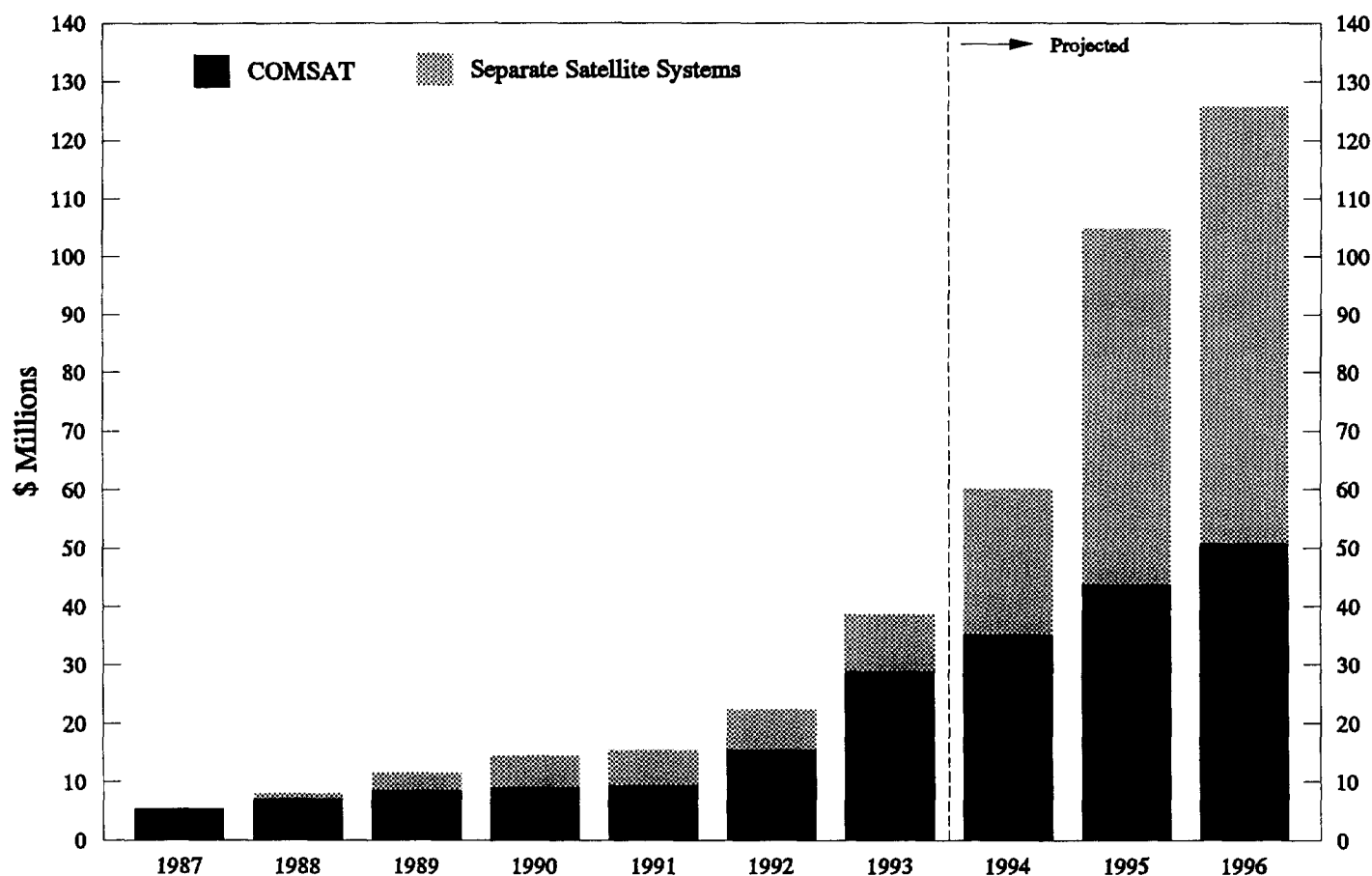
COMSAT's market shares in video and audio services as measured by revenues are well below the market shares measured in terms of utilized capacity.¹²⁰ **Figure 16** (on page 74) shows that only the trans-Atlantic market segment displays a projected market share of close to 50 percent by the end of 1996. Again, this projection does not include any trans-Atlantic video services on satellite systems other than PanAmSat and Orion-1, nor any video services that may be carried on fiber optic cables. Revenue market shares are *already* only about 30 percent in the Latin America market segment and are expected to drop to 35 percent in the Pacific once PanAmSat's PAS-2 satellite becomes operational later this year.

¹¹⁸ Note that, in order to be conservative, only revenues for the half-circuits originating or terminating in the U.S. are taken into consideration. See Chapter V.

¹¹⁹ As noted before, PanAmSat has already negotiated pre-launch agreements totaling \$958 million with international television programmers for the long-term lease of capacity on its three new satellites.

¹²⁰ This is primarily because COMSAT's rates for trans-Pacific video leases, which are on inclined-orbit satellites, are below the rates charged for leases on fully station-kept satellites. Until March 1996 when new Intelsat satellites become available, COMSAT will not be able to offer trans-Pacific video and audio services on station-kept satellites.

Figure 15
Revenues from Trans-Oceanic Video and Audio Services
(Based on 36/27 Mhz transponder leases to and from the U.S.)



NOTES:

Does not include services on cables or on separate satellite systems other than PanAmSat and Orion 1.

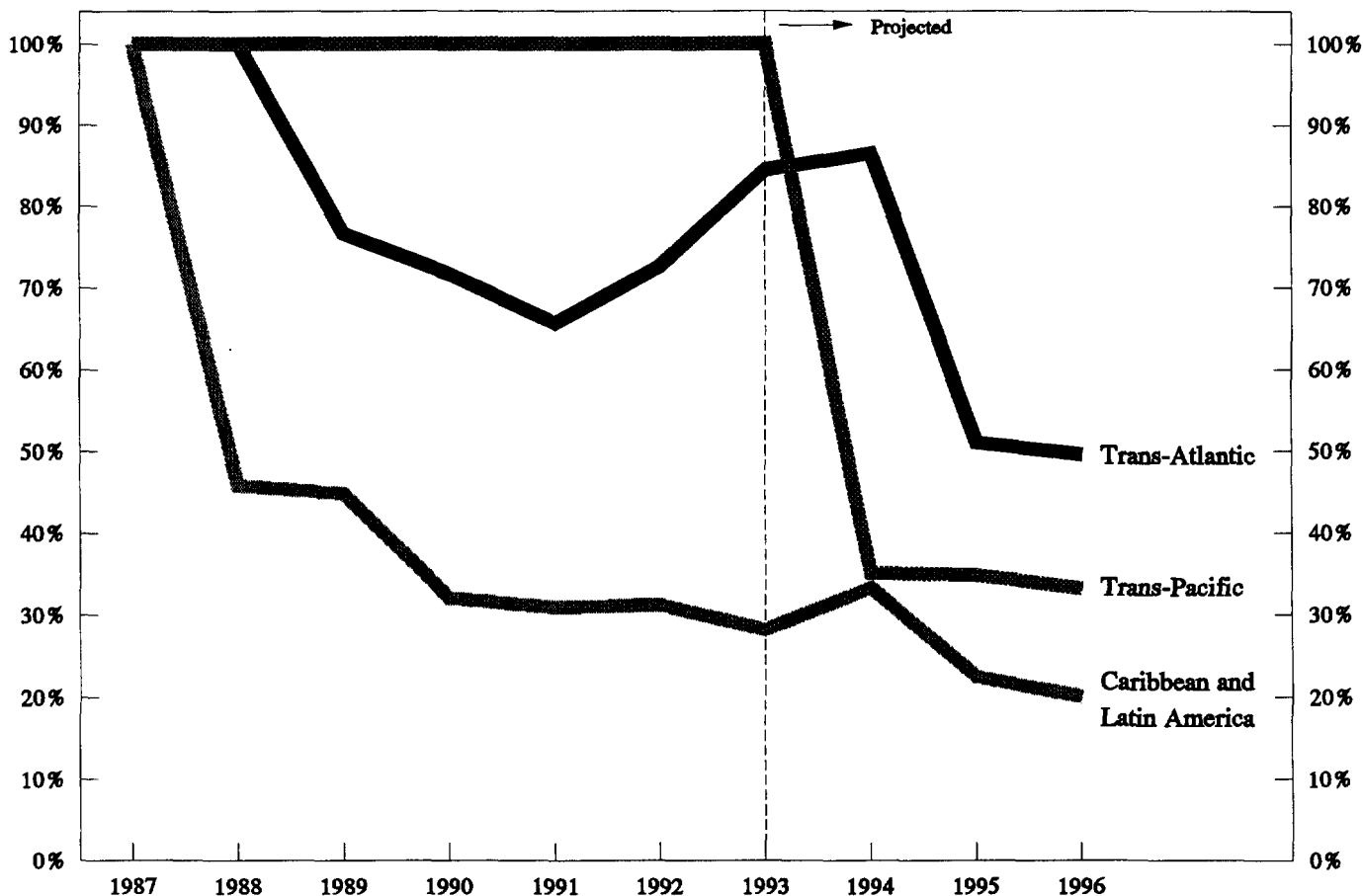
Also does not include capacity on U.S. domestic satellites available for service to the Caribbean and Latin America.

Only includes revenues from half-circuits originating or terminating in the U.S.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-6.2

Figure 16
COMSAT Market Shares in
Revenues from Video and Audio Services
(Based on 36/27 Mhz transponder revenues to and from the U.S.)



NOTES:

Does not take into consideration services on cables or on separate satellite systems other than PanAmSat and Orion 1. Also does not take into consideration capacity on U.S. domestic satellites available for service to the Caribbean and Latin America.

Only includes revenues from half-circuits originating or terminating in the U.S.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-6.2

COMPETITION FROM FACILITIES NOT REFLECTED IN CURRENT AND PROJECTED MARKET SHARES

COMSAT's market shares as quantified above are most likely overstated. Trans-oceanic video services could neither be projected for most domestic and separate satellite systems nor for fiber optic cables. Only the competition from PanAmSat and Orion could be quantified in terms of projected video transponder leases. No data on other existing or planned trans-oceanic video leases on domestic and separate satellite systems were available. The satellite systems for which video services were *not* quantified in this study include domestic U.S., Mexican, and Canadian satellites likely to provide video and audio services to the Caribbean and the northern part of Latin America,¹²¹ trans-Atlantic satellites like TDRSS-East,¹²² Hispasat, Globostar, Gorizont-20 and Gorizont-26, and the trans-Pacific satellites TDRSS-West,¹²³ Rimsat, Pacificom-1, Gorizont-17, and Gorizont-24.

Also, projections of market share for video and audio services in 1996 do not include *any* video services that may be routed over trans-oceanic fiber optic cable systems. Fiber optic cables already carry a significant fraction of domestic video transmission services, especially in the point-to-point video market.¹²⁴ Broadcasters that are currently using satellite capacity for point-to-point links between major cities in the U.S. and overseas are, with little doubt, already exploring the feasibility of using digital video transmission via fiber optic cables for this purpose. As more and more video transmission moves from analog to digital technology, the all-digital fiber optic cables will become particularly attractive.

¹²¹ For example, the FCC has authorized thirty U.S. domestic satellites to provide video, audio, and data broadcast services to 18 countries in the Caribbean and northern Latin America (*See FCC Public Notice*, Report No. IS-0040, rel. November 15, 1993).

¹²² Excluding TDRSS-East from market share projections is certain to overstate COMSAT's trans-Atlantic market shares considering that Columbia is already authorized to provide service to 16 countries in Europe. (*See FCC Public Notice*, Report No. IS-0040, rel. November 15, 1993, Attachment 5.) Also, Polonia already leased one transponder on TDRSS-East for service from the U.S. to Poland (*Cable and Satellite Europe*, April 1994).

¹²³ COMSAT noted that the BBC recently signed a contract to lease one transponder on TDRSS-West for service from the U.S. to East Asia.

¹²⁴ *See "Satellite or Fiber? The Distinctions Blur," Satellite Communications*, June 1992, 26-29.

As regional fiber optic networks in Europe and East Asia grow in size and density, point-to-point trans-oceanic video services become ever more vulnerable to competition from fiber optic cables. In fact, the National Telecommunications and Information Administration (NTIA) has already noted that TV broadcasters soon will begin to use undersea fiber optic cables as a significant medium for international video program transmission.¹²⁵

COMPETITION TO COMSAT FROM THE THREAT OF ENTRY FOR VIDEO AND AUDIO SERVICES

In addition to the threat that existing and planned fiber optic cables will enter the market for trans-oceanic video and audio services, COMSAT also faces competition from the threat of entry by new facilities to provide these services.

Market entry for separate satellite systems has been especially attractive because of the fast growing demand for video and audio services. The transmission capacity of one satellite is relatively small compared to the size of the total market and its annual growth. For example, PanAmSat's PAS-2 satellite will provide a maximum of 24 transponder leases to and from the U.S. This compares to an average annual increase of approximately 20 full-time transponder leases over the last two years.

In addition, entry of separate satellite systems for service to and from the U.S. is further facilitated by opportunities to use the same satellites to share in the growth in intraregional and interregional video and audio services that do not involve the U.S. Opportunities for transmission services within and among other geographic regions may even exceed those that involve the U.S. In addition to demand for video and audio services, market entrants will benefit from the world-wide growth in both private line and switched voice services.

Already, there is a significant threat of new facilities. The proposed Celestar separate satellite system will be able to offer video service on up to 48 two-way transponders to and from the U.S. in the Pacific Ocean Region by 1998.¹²⁶ Orion has stated that a main focus of two

¹²⁵ NTIA, *Globalization of the Mass Media*, Special Publication, 93-290, January 1993, at 33-34.

¹²⁶ See *Celestar Application*.

additional satellites in the Atlantic and Pacific Ocean Regions will be transponder service for the television networks.¹²⁷ Similarly, TRW has noted that it will apply for authorization for a Pacificom-2 satellite as soon as needed.¹²⁸ Finally, Teledesic's proposed \$9 billion low-orbit satellite system would provide sufficient capacity and bandwidth to offer world-wide video services in addition to switched voice and wideband private line services.¹²⁹

CONCLUSIONS

COMSAT's declining market share of utilized trans-oceanic telecommunications capacity for video and audio services shows the presence of effective competition. Between 1987 and 1996, trans-oceanic market shares as measured in terms of utilized capacity will decline from 100 percent to as low as 40 percent. Market shares for incremental video and audio services will be below 40 percent in two of three geographic market segments. In terms of revenues, the average world-wide market share will be approximately 40 percent; disaggregated market shares are expected to drop to or below 50 percent in all geographic market segments. Moreover, it is reasonable to conclude that these market shares are overstated because of limited information on existing and planned separate satellite systems. They will be further reduced by emerging trans-oceanic video and audio services provided on fiber optic cables.

Table 5 summarizes competition in the market for trans-oceanic video and audio services to and from the U.S. from existing and planned facilities¹³⁰ as well as from the threat of entry. Considering all types of competition, market power will be effectively constrained in all geographic market segments.

¹²⁷ See "W. Neil Bauer: President and Chief Executive Officer, Orion Network Systems Inc.," *Space News*, March 14-20, 1994.

¹²⁸ *Application of TRW Inc. for Authority to Construct, Launch and Operate PACIFICOM-1*, FCC File No. CSS-91-012, filed September 10, 1991, at 6.

¹²⁹ See, e.g., "McCaw and Gates Seek to Form Global Communications Systems," *The Wall Street Journal*, March 21, 1994, at A-3, and "A Satellite System is Planned to Link Most of the Globe," *The New York Times*, March 21, 1994, at 1. See also *Teledesic Application*.

¹³⁰ See Exhibit HSH-10.

TABLE 5
EFFECTIVE COMPETITION IN VIDEO AND AUDIO SERVICES

GEOGRAPHIC SEGMENT, U.S. TO:	MODE OF COMPETITION	CURRENT COMPETITION FROM:		
		EXISTING FACILITIES	PLANNED FACILITIES	THREAT OF ENTRY
Trans-Atlantic	Intermodal	—	—	Existing, planned and new cables
	Intramodal	PAS-1, TDRSS-East, Hispasat-1b, Gorizont-20, Gorizont-26	PAS-3, Orion-1, Globostar-1	Celestar, Orion, Teledesic, others
Trans-Pacific	Intermodal	—	—	Existing, planned and new cables
	Intramodal	TDRSS-West, Gorizont-17, Gorizont-24	PAS-2, Rimsat, Pacificom-1	Celestar, Orion, TRW, Teledesic, others
Caribbean & Latin America	Intermodal	—	—	Existing, planned and new cables
	Intramodal	PAS-1, TDRSS-East, Domasats	PAS-3, Orion-1, Globostar-1, Domasats	Celestar, Orion, Teledesic, Domasats, others

Source: Exhibit HSH-10

VIII. COMPETITION FROM AVAILABLE FACILITIES AND IDLE CAPACITY

COMSAT also faces effective competition because of fast-growing available capacity and substantial idle capacity on existing (and planned) trans-oceanic telecommunications facilities:

- Between 1986 and 1996 total available trans-oceanic capacity will have increased by a factor of eight while COMSAT's available capacity will have less than tripled. This shows that COMSAT cannot control entry of competing trans-oceanic facilities.
- COMSAT's share of available trans-oceanic capacity has dropped from 75-90 percent in 1987 to about 40 percent in 1993; by 1996, COMSAT's share of available capacity in the Atlantic and Pacific Ocean regions will be below 30 percent. As a result, competition to COMSAT will continue to increase.
- Existing trans-Atlantic and trans-Pacific cable systems appear to have enough idle capacity to absorb all of COMSAT's service to these regions; idle capacity on trans-Caribbean cables could absorb most of COMSAT's switched voice and private line services to the Caribbean/Latin America segment.
- Capacity on existing and planned separate satellite systems is sufficient to accommodate all or most of COMSAT's switched voice and private line services to regions easily accessible by cable; in particular, even with the current limit of 1,250 bearer circuits interconnected to the public switched network, existing and planned separate satellite systems could absorb COMSAT's switched voice services in these market segments.

COMSAT'S DECLINING SHARE OF AVAILABLE TRANS-OCEANIC CAPACITY

The capacity available on existing and planned trans-oceanic telecommunications facilities for services to and from the U.S. has been growing at a rapid pace in both the AOR and POR.¹³¹

¹³¹ The AOR includes the geographic market segments: Europe/Mediterranean/Middle East, Caribbean/Latin America, Rest of Latin America, and Rest of AOR. The POR includes the geographic market segments: (continued...)

Figure 17 (on page 81) illustrates that from 1986 to 1993, total existing trans-oceanic capacity for service to and from the U.S. grew almost four-fold to approximately 280,000 64 kbps-equivalent circuits. Through planned facilities that will be in place by the end of 1996, another 400,000 circuits will be added.

Figure 18 (on page 82) illustrates that COMSAT (via Intelsat) will have almost tripled its available capacity in the AOR from 1986 through 1996. In spite of the impressive growth in satellite capacity, the growth in new cable and separate satellite facilities will have far outpaced the growth in satellite capacity available to COMSAT in the AOR. For example, by 1996 separate satellite systems, not even present in 1987, will have added nine new AOR satellites with about 28,000 circuits available for service to and from the U.S.¹³²

Figure 19 (on page 83) illustrates available capacity on various facility types for service to and from the U.S. in the POR. Here too, capacity of cable and separate satellite systems has been added at a rapid pace, exceeding total capacity available to COMSAT in 1992. The addition of the high-capacity TPC-5 cable system in 1996 will alone make available cable capacity almost three times the total available capacity on POR satellites.

This rapid growth of existing and planned trans-oceanic telecommunications capacity provided by competitors convincingly illustrates that COMSAT cannot control entry by competing trans-oceanic facilities. As a result, COMSAT's share of available trans-oceanic capacity has dropped significantly and continues to decline. The extent of effective competition to COMSAT is certain to increase.

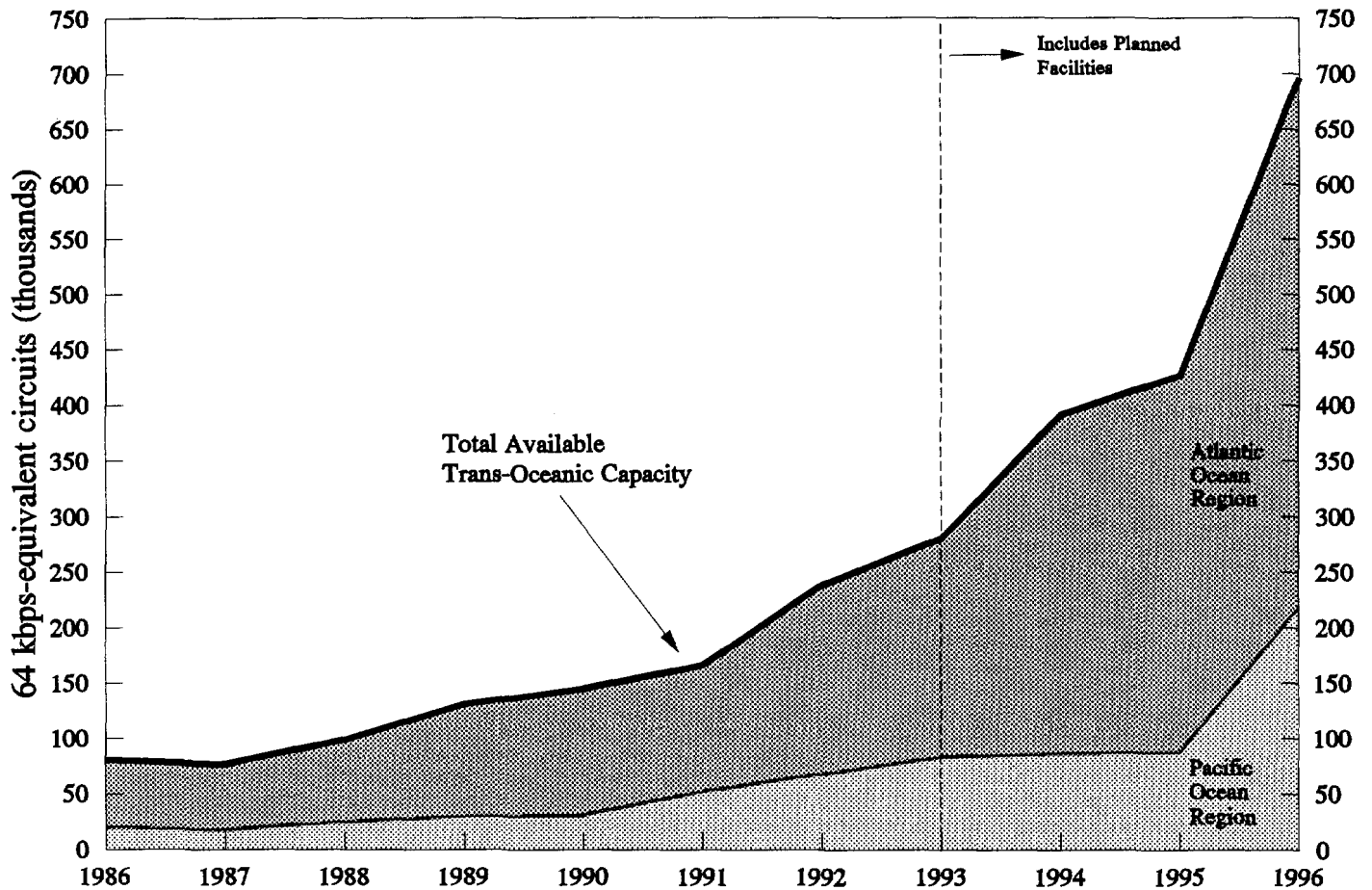
¹³¹(...continued)

East Asia/Oceania and Rest of POR.

Total available capacity is divided only between the AOR and POR because allocation of available satellite capacity to the six or even three geographic market segments identified above would be arbitrary. Satellite capacity can be shifted between geographic market segments within an ocean region. (See Chapter V for a more detailed explanation).

¹³² This takes into consideration that, in total, Hispasat 1a and Hispasat 1b have only two transponders available for trans-Atlantic service.

Figure 17
Available Trans-Oceanic Telecommunications Capacity
 (Available design capacity in 64 kbps-equivalent circuits to and from the U.S.)

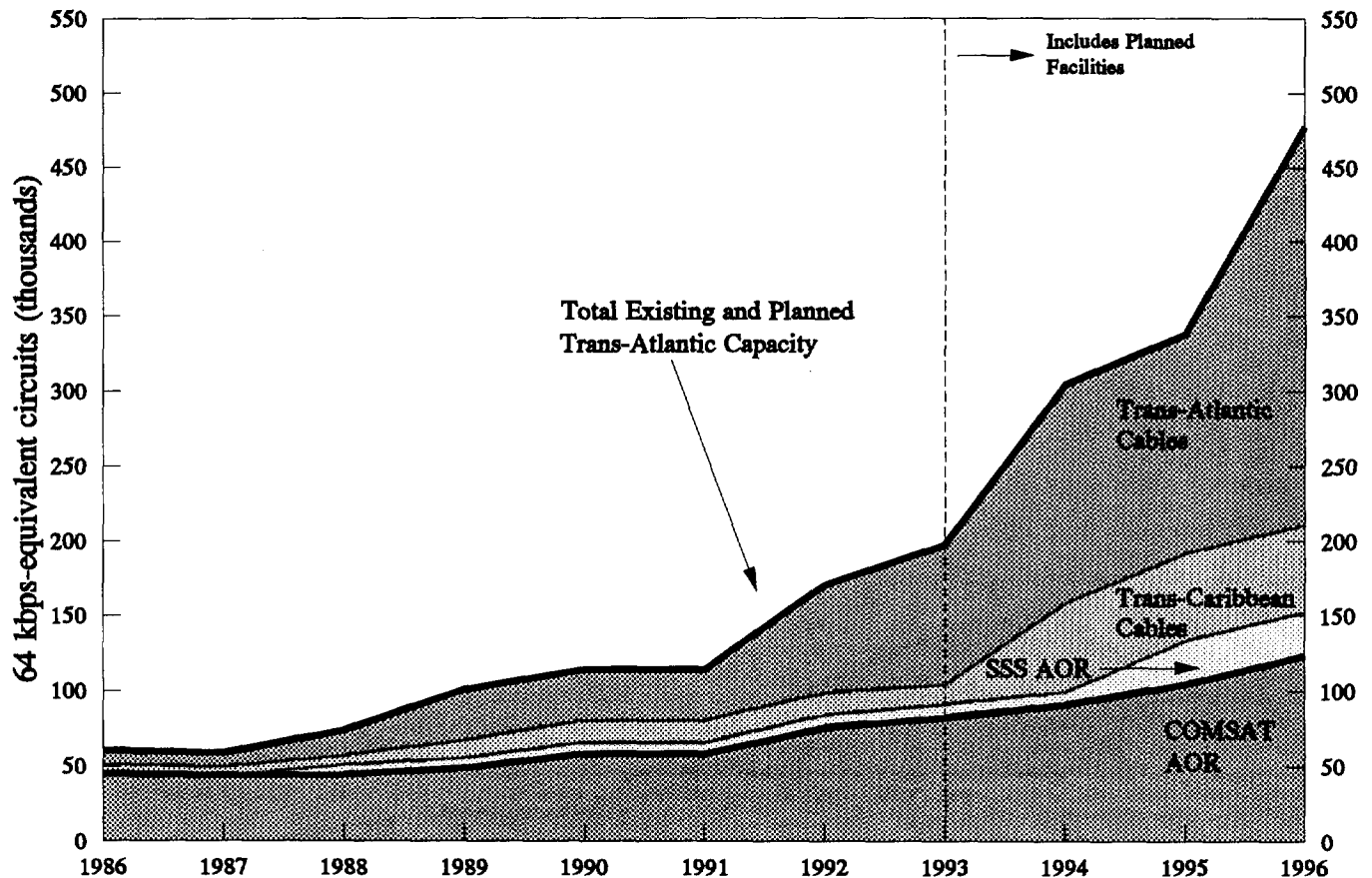


NOTES:

See Chapter V for a discussion of data sources and assumptions.

Source: Exhibit HSH-7.1

Figure 18
Available Capacity in the Atlantic Ocean Region:
COMSAT vs. Other Carriers
 (Available design capacity in 64 kbps-equivalent circuits to and from the U.S.)



NOTES:

Maximum COMSAT capacity is assumed to be 50 percent of INTELSAT AOR capacity.

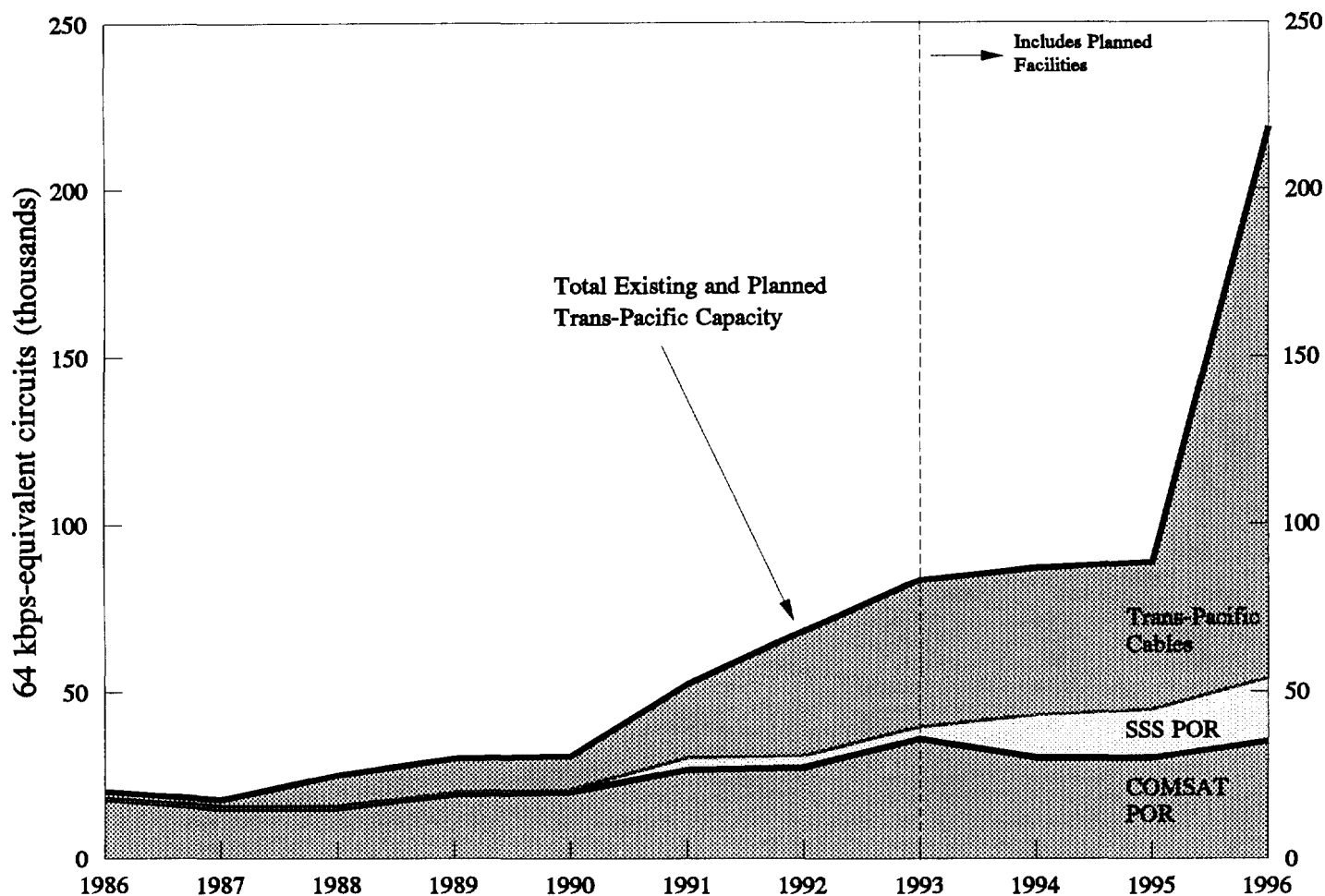
Maximum separate satellite systems (SSS) capacity available for trans-oceanic service to and from the U.S. assumed to be 50 percent.

Does not include capacity on U.S. domestic satellites available for service to the Caribbean and Latin America.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-7.1

Figure 19
Available Capacity in the Pacific Ocean Region:
COMSAT vs. Other Carriers
 (Available design capacity in 64 kbps-equivalent circuits to and from the U.S.)



NOTES:

Maximum COMSAT capacity is assumed to be 50 percent of INTELSAT POR capacity.

Maximum separate satellite systems (SSS) capacity available for trans-oceanic service to and from the U.S. assumed to be 50 percent.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-7.1

Figure 20 (on page 85) shows that COMSAT's share of available capacity has dropped from a range of 75 to 90 percent in 1986 and 1987 to approximately 40 percent in 1993. COMSAT's share of available capacity in both ocean regions will be below 30 percent in 1996. This decline in share of available trans-oceanic capacity strongly supports the conclusion that COMSAT's market shares in utilized capacity for switched voice, private line, and video and audio services will continue to decrease.

IDLE CAPACITY ON COMPETING FACILITIES

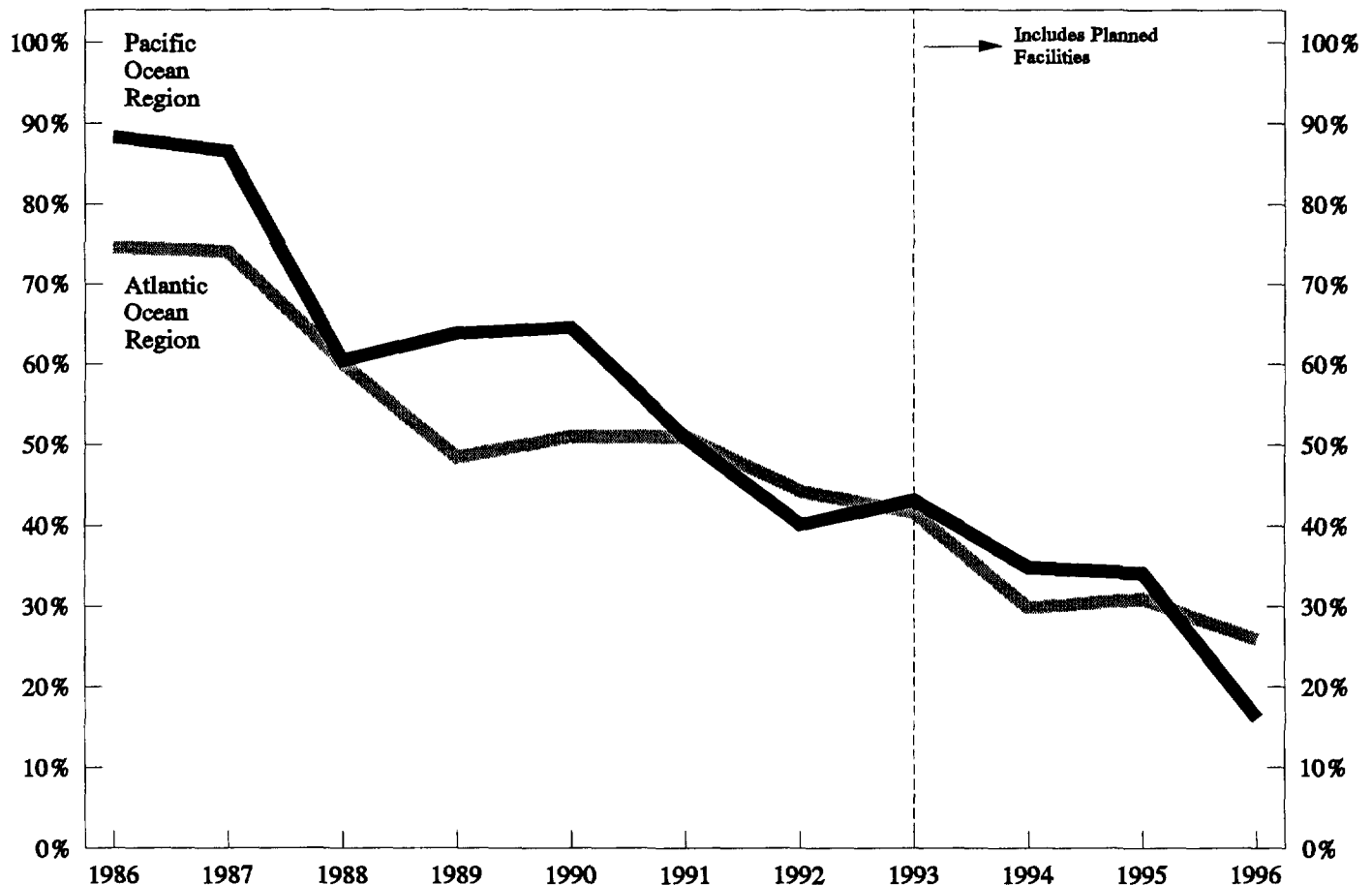
Idle capacity on alternative facilities provides effective competition to COMSAT and thus constrains market power. Currently, vast amounts of idle capacity are available on existing and planned cable systems. Figure 21 (on page 86) illustrates that the total available capacity of existing facilities is already approximately three times the total utilized capacity. Unless growth in utilized capacity increases substantially, planned facilities will further increase the level of idle capacity. This, however, does not necessarily mean that the same extent of idle capacity exists for service from all carriers or to all geographic market segments. Quantification of idle capacity for service to specific geographic market segments can be achieved by disaggregating the data on idle capacity by cable and satellite systems.

Idle Capacity on Competing Trans-Oceanic Cable Systems

The extent of idle capacity is primarily a result of the relatively low utilization of existing cable systems.¹³³ Cable fill rates have dropped since 1990 when several high-capacity trans-oceanic cables came on line: TAT-9, TAT-10, and TAT-11 on trans-Atlantic routes; and NPC, TPC-4, and HAW-5/PacRim East on trans-Pacific routes. Trans-Caribbean cables still show somewhat

¹³³ For the purpose of estimating total utilized 64 kbps-equivalent circuits on these cable systems, it is assumed that AT&T's cable fill rate is representative for all other carriers. Even if carriers other than AT&T filled their share of cable facilities to a greater extent, this would not change the overall conclusions. The total cable fill rate is constrained by the fact that AT&T-owned capacity accounts for almost half of the cable systems' total design capacity. If the overall cable fill rates were higher than AT&T's, idle capacity would be lower than these estimates. However, higher cable fill rates would also result in an increase of utilized capacity and a corresponding decrease in COMSAT's market shares.

Figure 20
COMSAT Share of Available Trans-Oceanic Capacity
 (Based on 64 kbps-equivalent circuits design capacity)



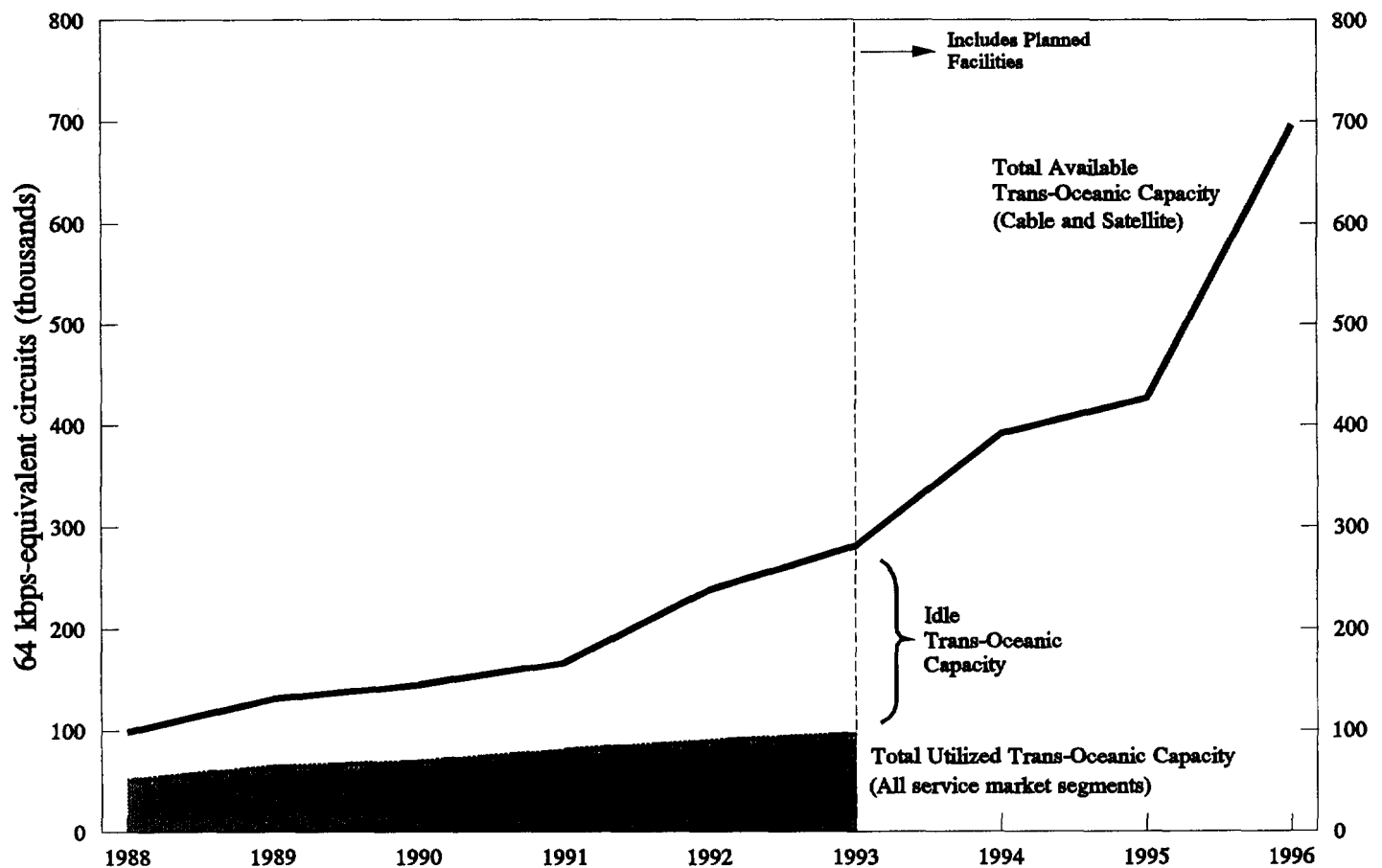
NOTES:

Maximum available COMSAT capacity is assumed to be 50 percent of INTELSAT AOR and POR capacity. Maximum separate satellite systems (SSS) capacity available for trans-oceanic service to and from the U.S. assumed to be 50 percent.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-7.1

Figure 21
Available vs. Utilized Trans-Oceanic Capacity
(64 kbps-equivalent circuits to and from the U.S.)



NOTES:

One 36/27 Mhz-equivalent transponder lease is assumed to be equal to 275 64 kbps-equivalent duplex circuits.
 See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-7.2

higher fill rates because new cable systems will only become available later this year.¹³⁴

The effective amount of idle cable capacity is higher than indicated. This is because USISCs' rate of digital compression is significantly lower on cables than on satellites. For example, AT&T's 1993 average digital compression rate of 1.9 on trans-oceanic cables compares to a compression rate of 2.6 on COMSAT.¹³⁵ As a consequence, by simply increasing compression rates on trans-oceanic cables, USISCs would be able to move satellite traffic onto cables without the need to increase utilized cable capacity.

The amount of idle capacity is particularly striking on routes serving the geographic market segments that are easily accessible by cables even without consideration of differences in digital compression rates. Figure 22 (on page 88) shows that existing idle capacity on trans-Atlantic cable systems serving the Europe/Mediterranean/Middle East market segment now significantly exceeds COMSAT's total utilized circuits for switched voice and private line services to Europe/Mediterranean/Middle East. As of 1993, trans-Atlantic cables could easily absorb *all* of COMSAT's switched voice and private line services to Europe/Mediterranean/Middle East. There would still be enough idle capacity left to accommodate easily all of the trans-Atlantic video and audio transmission on both COMSAT and separate satellite systems.¹³⁶

Idle capacity is going to persist. By the end of 1996, three new trans-Atlantic cable systems¹³⁷ will be on line, so that installed trans-Atlantic cable capacity will have increased almost three-fold from the current 1993 levels. Unless demand for trans-oceanic facility-based telecommunications services grows just as fast or faster, the proportion of idle capacity will even increase from its current level.

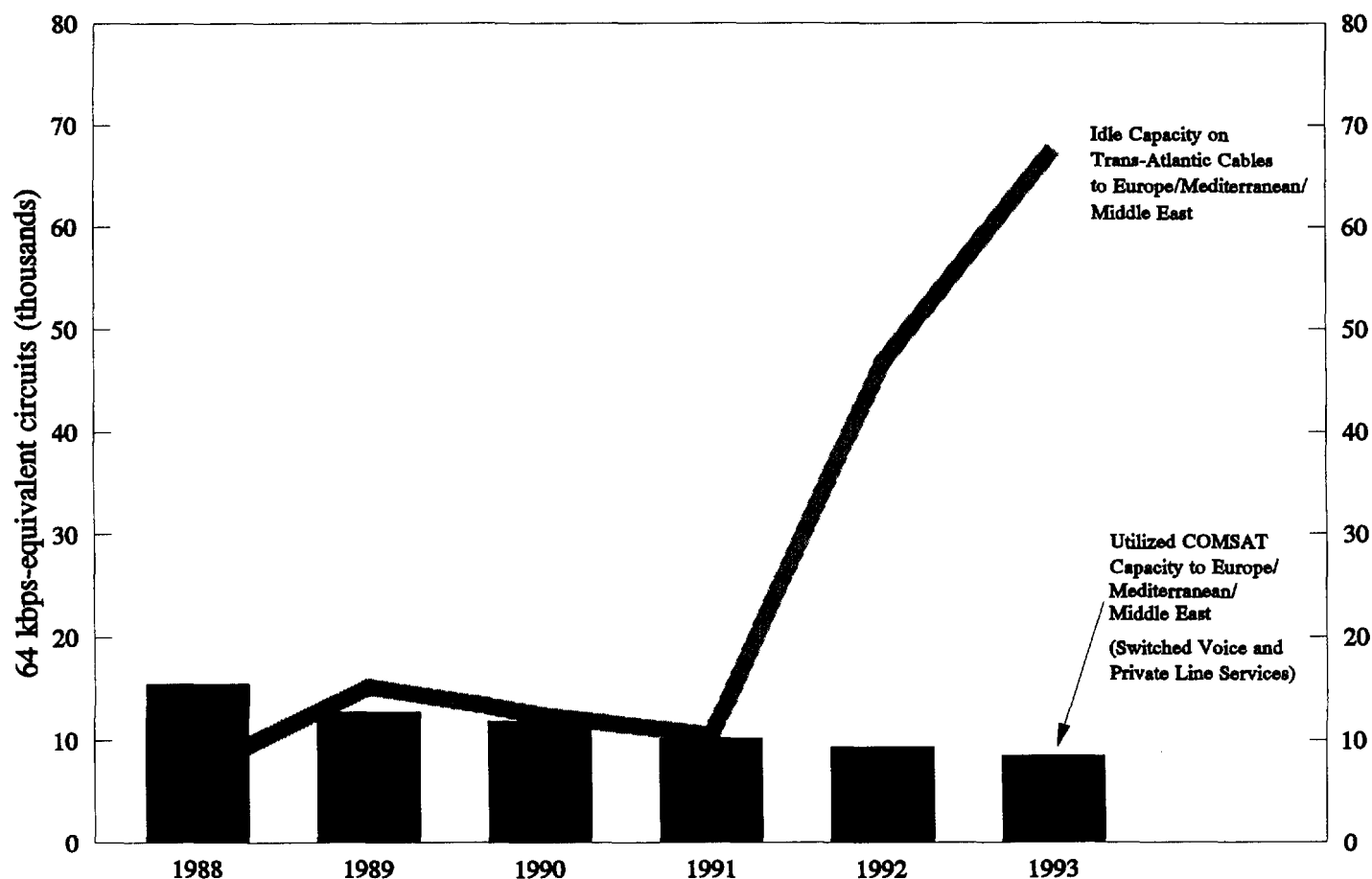
¹³⁴ See Exhibit HSH-3.

¹³⁵ See Exhibits HSH-3 and HSH-4.

¹³⁶ The current trans-Atlantic video and audio leases only account for a total of approximately 12,000 64 kbps-equivalent circuits (derived from Exhibit HSH-6.1).

¹³⁷ CANUS-1/CANTAT-3, Columbus 2, and TAT-12/TAT-13.

Figure 22
Idle Capacity on Trans-Atlantic Cable Systems
(64 kbps-equivalent circuits between the U.S. and Europe/Mediterr./M. East)



NOTES:

Total cable fill rate based on AT&T's cable fill rate.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-7.2

Significant idle capacity also exists on the trans-Pacific cable systems serving the East Asia/Oceania market segment. **Figure 23** (on page 90) shows that idle capacity on trans-Pacific cable systems significantly exceeds COMSAT's utilized capacity for switched voice and private line services to the Pacific Ocean market segments. This idle capacity on trans-Pacific cables could easily accommodate all of COMSAT's trans-Pacific video and audio services as well. Furthermore, by the end of 1996, the planned capacity of the TPC-5 cable system will more than triple the installed trans-Pacific cable capacity from the current 1993 levels.

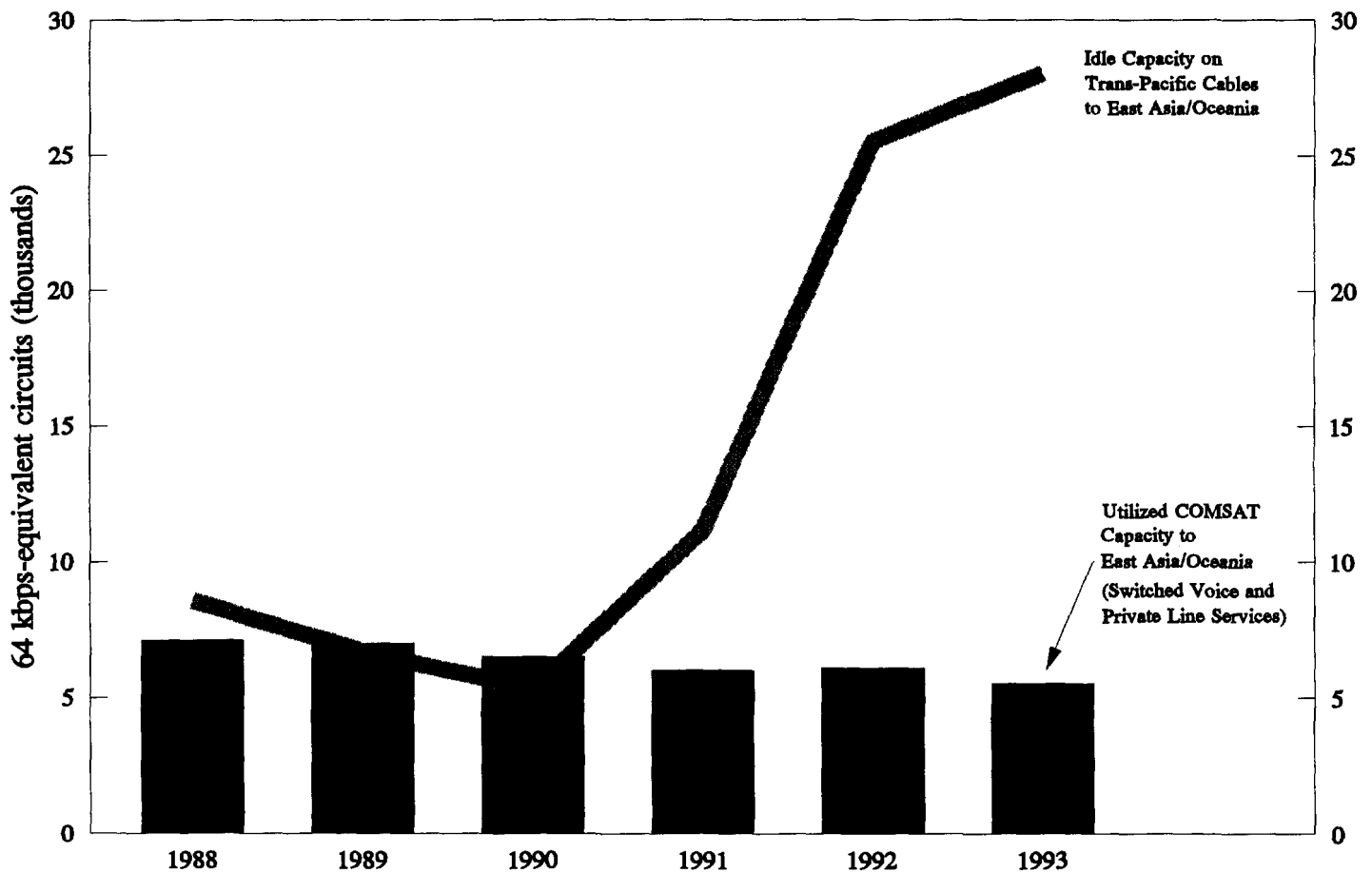
Idle capacity on trans-Caribbean cable systems serving the Caribbean/Latin America market segment shows a slightly different pattern. **Figure 24** (on page 91) shows that estimated idle capacity is currently over 90 percent of COMSAT's switched voice and private line services to the Caribbean/Latin America market segment. However, three fiber optic cable systems (Columbus-2, Americas-1, and Trans-Gulf) are expected to begin service later this year and will substantially increase idle capacity.

The amount of idle capacity on trans-oceanic fiber optic cables is understandable:

- USISCs have a strong incentive to install fiber optic cables with idle capacity because costs are primarily a function of the distance between connecting points and depend to a much lesser degree on the number of fiber strands being installed.
- Carriers have a strong interest in installing additional fiber optic cables to increase routing diversity, expand cable-based backup options, and increase the availability and reliability of the overall cable system.
- Cable systems are often not fully pre-subscribed by the time they become available.¹³⁸

¹³⁸ The design capacity of cables initially often exceeds the "notional" or pre-subscribed capacity.

Figure 23
Idle Capacity on Trans-Pacific Cable Systems
(64 kbps-equivalent circuits between the U.S. and East Asia/Oceania)



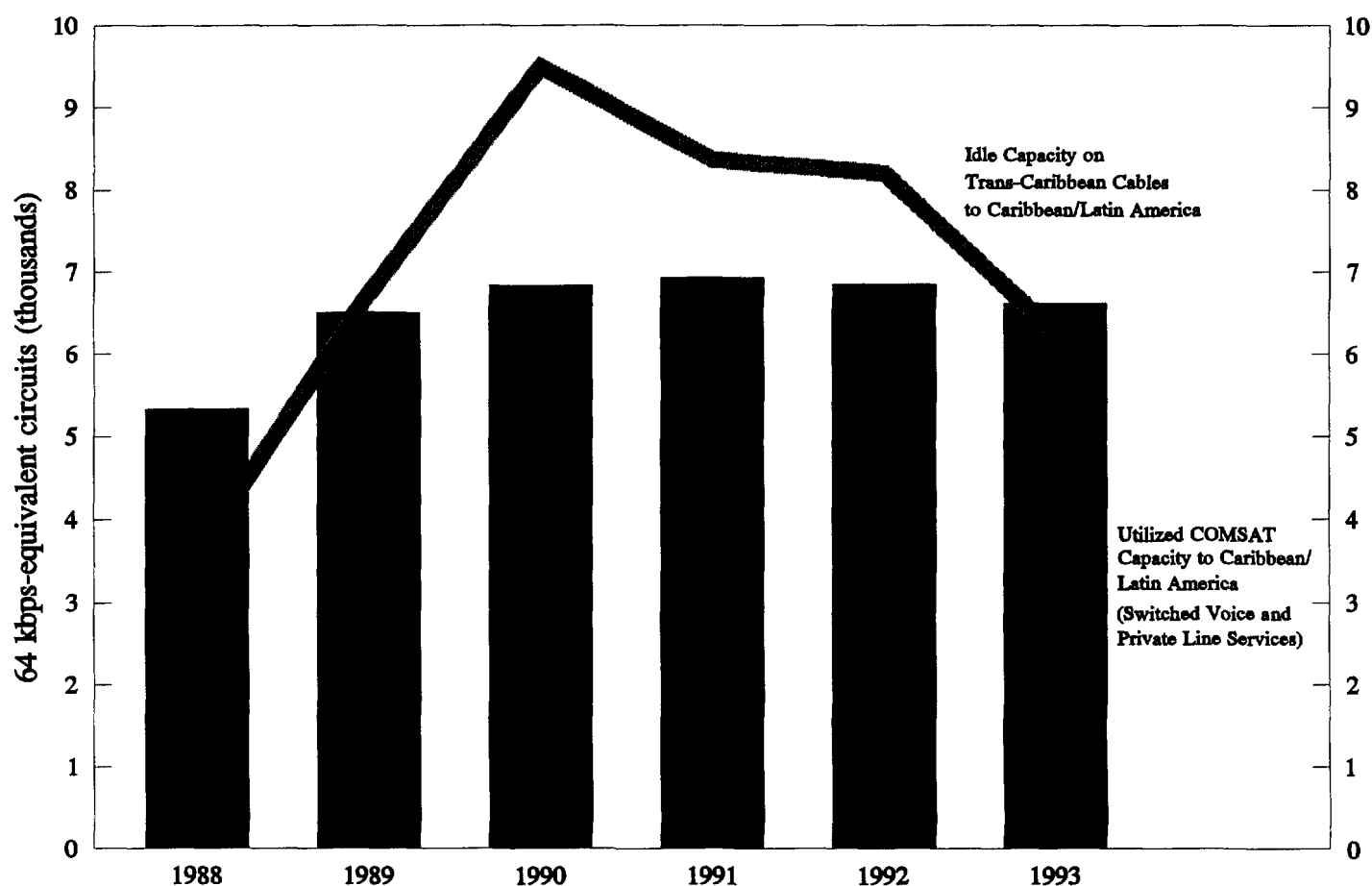
NOTES:

Total cable fill rate based on AT&T's cable fill rate.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-7.2

Figure 24
Idle Capacity on Trans-Caribbean Cable Systems
(64 kbps-equivalent circuits between the U.S. and Caribbean/Latin America)



NOTES:

Total cable fill rate based on AT&T's cable fill rate.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibit HSH-7.2

- Pre-subscription of fiber optic cable systems is based on carriers' long-term traffic projections;¹³⁹ even if cable systems are fully pre-subscribed, it typically takes several years until actual cable loading reaches or exceeds 80 percent.¹⁴⁰
- Technological advances such as digital compression have increased the effective capacity of existing facilities.¹⁴¹
- Advancements in technology have reduced the costs of fiber optic capacity to a level at which it is economical to construct new cable systems at comparatively low pre-subscription fill rates.
- Finally, because of rapid traffic growth, strategic considerations motivate USISCs competing for market share to maintain sufficient idle capacity to be able to accommodate whatever telecommunications traffic they can attract.

Idle Capacity on Competing Trans-Oceanic Satellite Systems

Capacity on planned separate satellite systems would also be able to accommodate much of COMSAT's switched voice and private line services to geographic market segments without competition from existing or planned cable systems. In 1993, COMSAT provided only approximately 4,300 64 kbps-equivalent switched voice and private line circuits to the regions without intermodal competition from existing and planned cables. The planned separate satellite

¹³⁹ In the example of the Columbus-2 fiber optic cable system coming on line in 1994, pre-subscription is based on projected capacity requirements for the year 2010. (*See Joint Application of AT&T, et al., for Authorization Under Section 214 of the Communications Act of 1934, as Amended, to Construct, Acquire Capacity in and Operate a High Capacity Digital Submarine Cable System Between and Among the United States Mainland, Mexico, U.S. Virgin Islands, Spain, Italy and Portugal*, FCC File No. I-T-C-93-029, filed Nov. 10, 1992, at 17.) *See also n. 36.*

¹⁴⁰ The pre-subscribed or notional capacity is typically based on long-term forecasts of future capacity needs, and consequently, exceeds utilized capacity. As a consequence, the utilized capacity is only a fraction of the cables' overall design capacity.

¹⁴¹ For example, with digital compression technology carriers can transmit up to five switched voice circuits over the cable or satellite capacity that was traditionally needed for one analog circuit. From 1988 to 1993, the *average* compression on AT&T's cables increased from zero to a compression rate of more than two. Thus, the *effective* idle capacity on AT&T's cables has increased accordingly. (*See Exhibit HSH-3.*) Similarly, PanAmSat has introduced digital compression for video services in 1993 and is now able to pack as many as six digital video circuits into the capacity traditionally used by one analog video circuit (*See PAS SEC Form S-1 at 32.*)